

2010 Vegetation Surveys

Introduction

Vegetation surveys are conducted at the Rocky Flats Site (Site) to provide information necessary for managing the natural resources. The Site comprises the Central Operable Unit (COU) and Peripheral Operable Unit (POU) (Figure 1). Surveying activities were predominantly conducted within the COU, although some sections of the POU were surveyed because they have not yet transferred to the U.S. Fish and Wildlife Service (USFWS) as part of the Rocky Flats National Wildlife Refuge (RFNWR). The objectives of the vegetation surveys in 2010 were to:

- Identify any new plant species not found at the Site previously.
- Identify and document infestations of selected noxious weeds at the Site to assist with the planning of noxious weed control applications.
- Document and track herbicide applications in 2010.
- Document where revegetation activities were conducted in 2010.
- Conduct photomonitoring for visual documentation of changes in vegetation establishment at the Site.

This section pertains to vegetation surveys. Revegetation monitoring to evaluate revegetation success across the Site is reported in the revegetation section of the annual report.

Methods

Weed Mapping

Mapping for selected weed species in the COU is a means of identifying high-priority treatment areas, monitoring the distribution of specific noxious weed species, discovering new weed species, and tracking the effectiveness of weed control. Weed mapping in the COU in 2010 was conducted both on foot and from a vehicle; binoculars were also used. Weed mapping was conducted when species were flowering or when they were most visible. Other species were mapped as fortuitous observations. The species mapped in the COU in 2010 included diffuse knapweed (*Centaurea diffusa*) and Dalmatian toadflax (*Linaria dalmatica*). Some species were mapped as fortuitous observations. These included Scotch thistle (*Onopordum acanthium*), Dame's rocket (*Hesperis matronalis*), leafy spurge (*Euphorbia uralensis*), tall mustard (*Cardaria chalepensis*), whitetop (*Cardaria draba*), and wild carrot (*Daucus carota*).

For mapping, infestation areas were classified into general density categories of high, medium, low, and scattered based on a subjective interpretation of the extent, visual density, need for control, and aggressive nature of the species. The high-density category indicated that an area was dominated by a nearly solid infestation or very high cover of the species. The medium-density category was used where the infestation provided less cover and was less homogeneous. The low-density category was used where individuals of the species were present in fewer numbers and were not visually dominating the landscape but were beginning to establish a foothold in the plant community and needed control. The scattered-density category indicated a sporadic occurrence of the species. The noxious weed populations and distributions were hand-

drawn in the field and should not be interpreted as a precise outline of the distribution of these species. Attempts were made to visit the entire Site but some infestations may have been missed.

Herbicide Applications and Revegetation Activities

Maps of herbicide applications and revegetation activities were prepared to show where herbicides were applied by the subcontractor and where interseeding activities took place during 2010.

Photographic Documentation

Photographs were taken at selected permanent photo points during summer 2010 to document and evaluate any changes resulting from climatic changes, natural resource management, or human activity. Photographs were compared to those taken previously. The time-series photographs can be viewed on the ecology DVD.

Results and Discussion

Site Flora

The complete list of plant species known to be at the Site at the end of 2010 is available on the ecology DVD. The Site species list includes the complete flora of both the COU and the POU. The vascular flora of the Site consists of 632 species of plants. Two new records of vascular plant species for the Site flora are reported. Common teasel (*Dipsacus fullonum*), a noxious weed, was found growing in a wetland area in Rock Creek near the Lindsay Ranch on the RFNWR. The patch of plants was small enough that eradication is possible before the species spreads throughout the drainage. The USFWS was contacted and informed of the population. This species is common on surrounding lands, and future monitoring will continue to look for it elsewhere at the Site. Yellow cress (*Rorippa teres*), a small mustard plant, was found growing along the pond margin in the mud flats at Pond A-2. The species is a native wetland plant. The following taxonomic names will be used at the Site for the new plant species records¹:

Family	Scientific Name	Speccode	Common Name
Dipsacaceae	<i>Dipsacus fullonum</i> L.	DIFU1	Common Teasel
Brassicaceae	<i>Rorippa teres</i> (Michaux) Stuckey	ROTE1	Yellow Cress

Voucher specimens of the species will be deposited at the University of Colorado Herbarium in Boulder, Colorado.

Weed Mapping and Weed Control

Figures 2 and 3 show the 2010 weed distribution maps for diffuse knapweed and Dalmatian toadflax, respectively. Table 1 shows the estimated total acreage and acreage-by-density categories for each species, based on the mapping data from 2007 through 2010. The total area of the COU is approximately 1,308 acres. In 2010, diffuse knapweed was observed on approximately 230 acres at various levels of infestation. Dalmatian toadflax was mapped on

¹ Nomenclature follows GPFA (1986), Weber (1976), Weber (1990), Weber and Wittmann (1992), and Weber and Wittmann (2001), in that order of determination. Species were verified at the University of Colorado Herbarium in, Boulder, Colorado.

approximately 168 acres in 2010. Both species showed a decrease in acreage compared to the 2009 mapping data. Annual fluctuations in the abundance of many grassland species are not uncommon as they respond to changes in temperature, precipitation amounts, timing of precipitation, and other environmental factors.

Additional species that were mapped based on fortuitous observations in 2010 included Scotch thistle, Dame's rocket, leafy spurge, tall mustard, whitetop, and wild carrot. No acreages are provided for these species since the polygons simply show the general location of the infestations. Figure 4 shows the locations of these species as mapped in 2010.

During 2010, approximately 264 acres were treated with herbicides at the Site via ground application (Figure 5). Table 2 lists the target species, herbicides used, application rates and the approximate timing of the application during the year. (**Note:** Multiple herbicides are listed at some locations. This does not mean that each herbicide was used across that entire location. Rather, depending on site-specific characteristics such as target weed species, the locations of water bodies, soil types, and the professional judgment of the licensed herbicide applicator, different herbicides were used within that location to provide the control needed.)

In 2007, a small patch of leafy spurge, a state-listed noxious weed, was documented for the first time at the Site. This patch was sprayed in 2007 to control its spread. In 2008, two additional small patches of leafy spurge were found in the northern COU. Because these new patches of leafy spurge had already started going to seed when they were discovered, the seedheads were cut off, bagged, and sent to the landfill for burial. These three locations and an additional location were sprayed with Plateau herbicide in 2009 to control the infestations. Observations in 2010 showed no leafy spurge plants flowered at any of the known locations. No plants were observed at one location, and a few small rosettes were starting to come up in October 2010 at the other locations. Additional control is planned for 2011 to eradicate the leafy spurge. Hand control and weed-whacking were also used to control some small patches of Scotch thistle, tall mustard, tamarisk (*Tamarix ramosissima*), and whitetop in 2010.

Biocontrol insects continue to be used at the Site. Stem-mining beetles (*Mecinus janthinus*) were released several years ago at a few locations to help control Dalmatian toadflax. Additional beetles were obtained from the Colorado Department of Agriculture in 2010 and released at two locations (Figure 6). Examination of several populations of Dalmatian toadflax at the site (both in the COU and POU) in 2010 showed that the beetles have essentially spread across the site. At nearly every location beetles were observed on the plants. Therefore, no future releases are planned, and the hope is that the beetles will continue to increase and expand, ultimately controlling the Dalmatian toadflax to a level at which herbicide applications are not required.

Collections and transplants from other established populations of various biocontrols at the site may continue to be made to further establish populations elsewhere across the site. Additional biocontrol insects for different weed species may be released as they become available. The integrated weed management approach at the site continues to address noxious weed issues through mapping and the use of various control methods.

A new noxious weed at the Site was observed in late August near the Lindsay Ranch in the POU on the RFNWR. Common teasel has never been found at the Site previously, but approximately two dozen plants, already having flowered and gone to seed, were observed along the main branch of Rock Creek. The USFWS was notified of the observation, and it was suggested that

control should be implemented to prevent the species from spreading throughout the adjacent wetlands and downstream.

Site ecology personnel participated in the Rocky Flats Weed Symposium held March 5, 2010, at the Broomfield Auditorium. A presentation entitled “Weed Control at Rocky Flats” was given discussing weed control activities at the Rocky Flats Site, both historically and ongoing. The purpose of the conference was to bring together surrounding landowners in the Rocky Flats area for networking and potentially to work toward more coordinated efforts for controlling noxious weeds.

Revegetation Activities

During winter, early spring, and fall 2010, interseeding was conducted on approximately 29 acres at the Site where vegetation cover was still sparse (Figure 7). At most of these locations, the seed was broadcast using an all-terrain-vehicle broadcast seeder. At some locations the seed was harrowed. Table 3 lists the activities at each location.

Volunteer Seed Collections

For the past several years the Jefferson County Nature Association has been conducting volunteer seed-picking days to provide local ecotype seed for inclusion in the revegetation efforts at the Rocky Flats Site and other nearby revegetation projects. The seed provided to the Site has been interseeded into revegetation areas to provide more local genotypes in these areas. Until recently, forbs have not been desirable because of the need to conduct weed control at many of the revegetation locations. However, as the prairie grasses continue to establish, the introduction of forbs (wildflowers) is becoming more desirable to increase the diversity of plant life and increase habitat for other wildlife and insect species. In late 2009, four forb “nursery” areas were established (Figure 8). The forb seed collected in fall 2009 was broadcast throughout these four locations in the hope of establishing pockets, or islands, of forbs that could then expand outward. Weed control in these areas will be conducted by hand or by mowing/weed-whacking. The common forb species that were hand collected and broadcast into these areas included golden aster (*Chrysopsis villosa*), blazing star (*Liatriis punctata*), groundsel (*Senecio spartioides*), and Porter’s aster (*Aster porteri*).

In June 2010, the volunteers collected needle-and-thread grass (*Stipa comata*) and New Mexico feathergrass (*Stipa neomexicana*), both native grasses that occur on the prairie at the Site. These species are rarely available commercially, and when they are available, they are very expensive. So the volunteers hand collected the seeds, and these were then hand broadcast into three locations for establishment (Figure 8). As with the forb islands, it is hoped that these species will establish at these locations and expand outward.

Summary

Managing natural resources at the site involved various tools in 2010, including weed control and revegetation activities. The threat from noxious weeds continues to be a high management priority at the Site, and weed control in both the revegetation areas and the natural areas remains a high priority within the COU. Approximately 264 acres in the COU were treated with herbicides in 2010 to control noxious weeds. Additional biocontrols were released to help control Dalmatian toadflax, and observations indicated the biocontrols for this species have already spread across most of the Site. Additional areas were interseeded to improve the stands of

desirable vegetation. Photomonitoring continued to document the establishment of vegetation at the revegetation locations. Over the next several years, the vegetation should continue to fill in and provide a good protective cover on the soils at the Site.

References

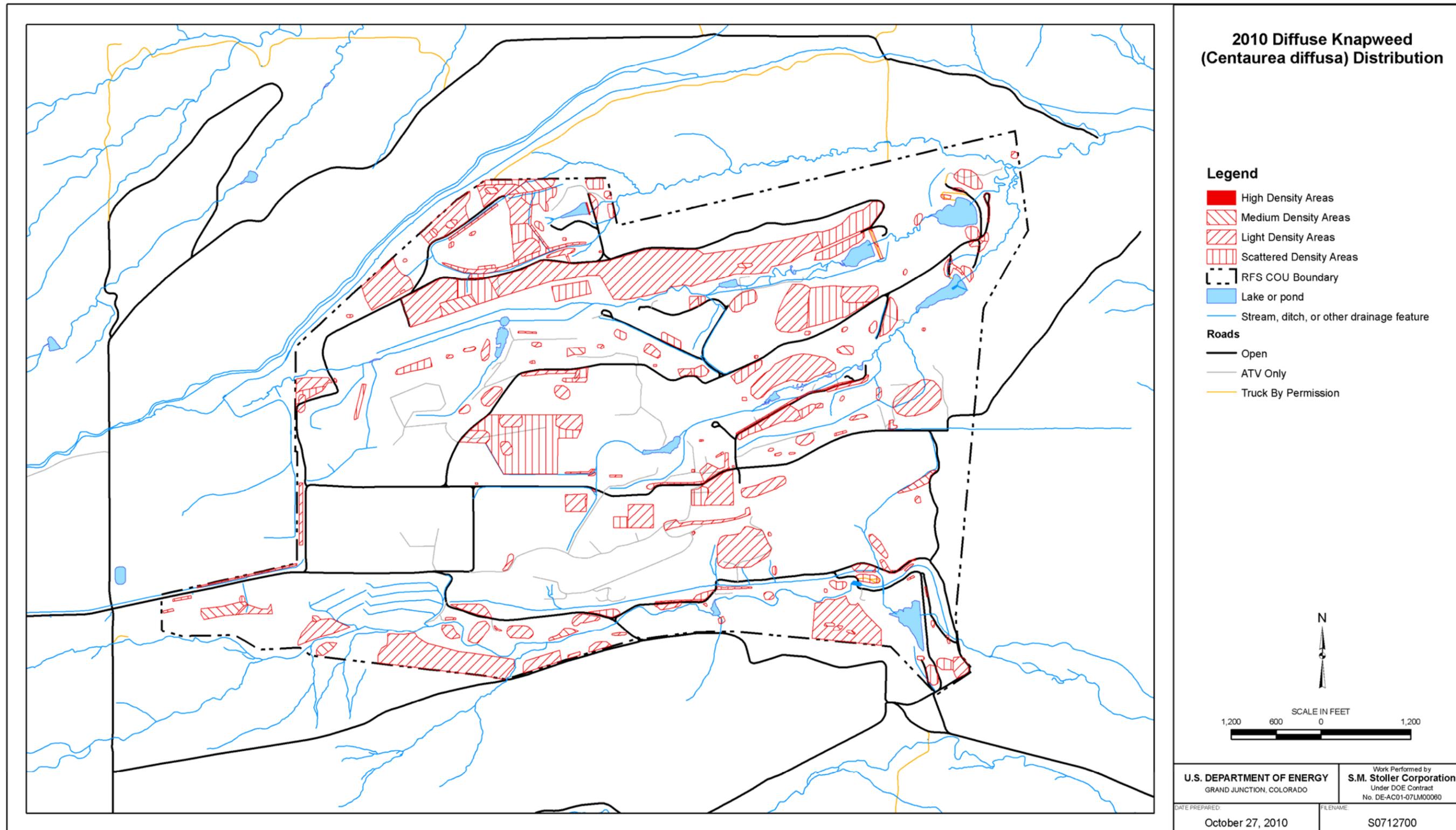
GPFA (Great Plains Flora Association), 1986. *Flora of the Great Plains*, 2nd printing with 1991 supplement, University Press of Kansas, Lawrence, Kansas.

Weber, W.A., 1976. *Rocky Mountain flora, Colorado*, Associated University Press, Boulder, Colorado.

Weber, W.A., 1990. *Colorado flora: Eastern Slope*, University Press of Colorado, Niwot, Colorado.

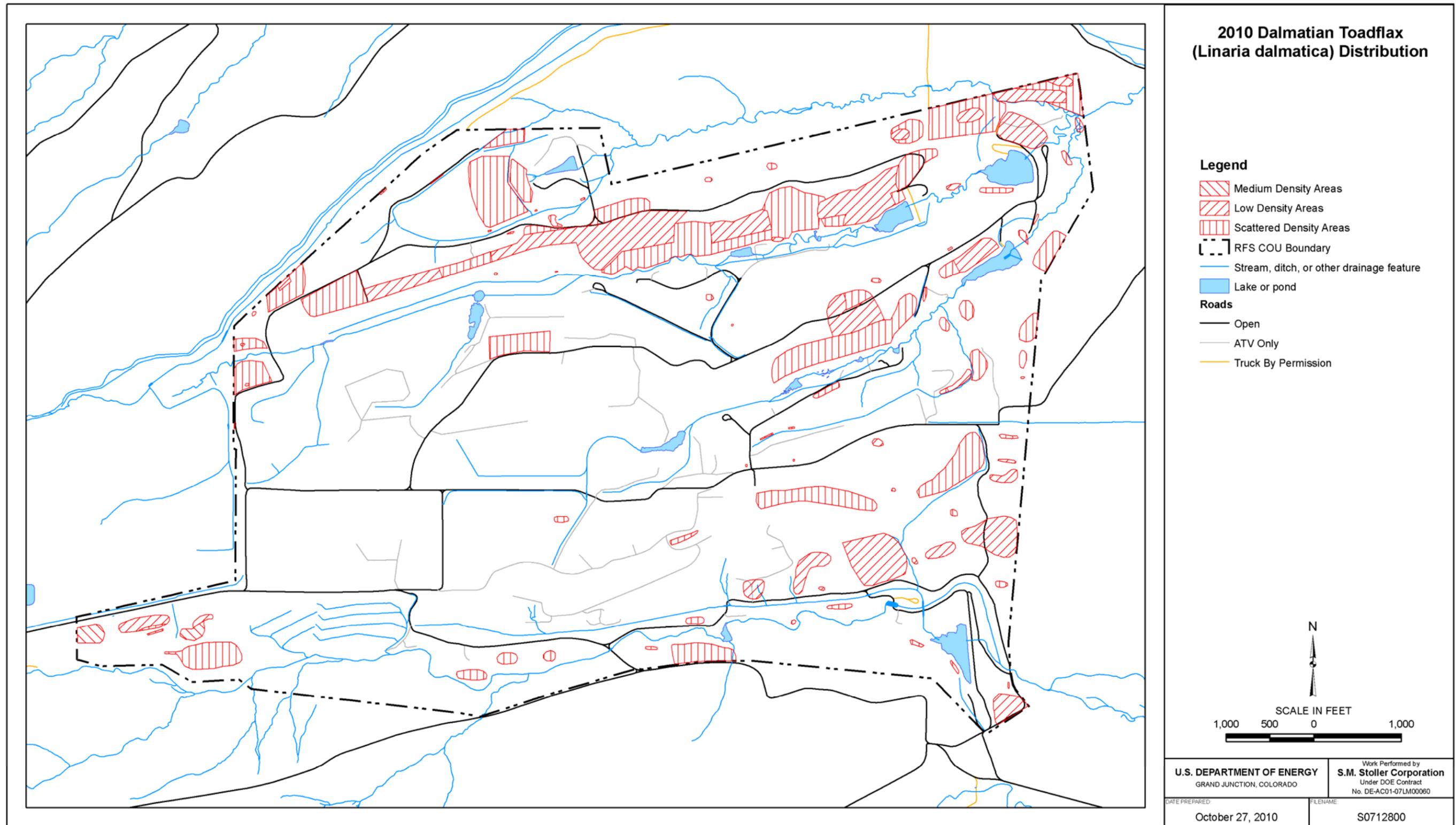
Weber, W.A., and R.C. Wittmann, 1992. *Catalog of the Colorado Flora: A Biodiversity Baseline*. University Press of Colorado, Niwot, Colorado.

Weber, W.A., and R.C. Wittmann, 2001. *Colorado Flora: Western Slope*, 3rd edition, University Press of Colorado, Niwot, Colorado.



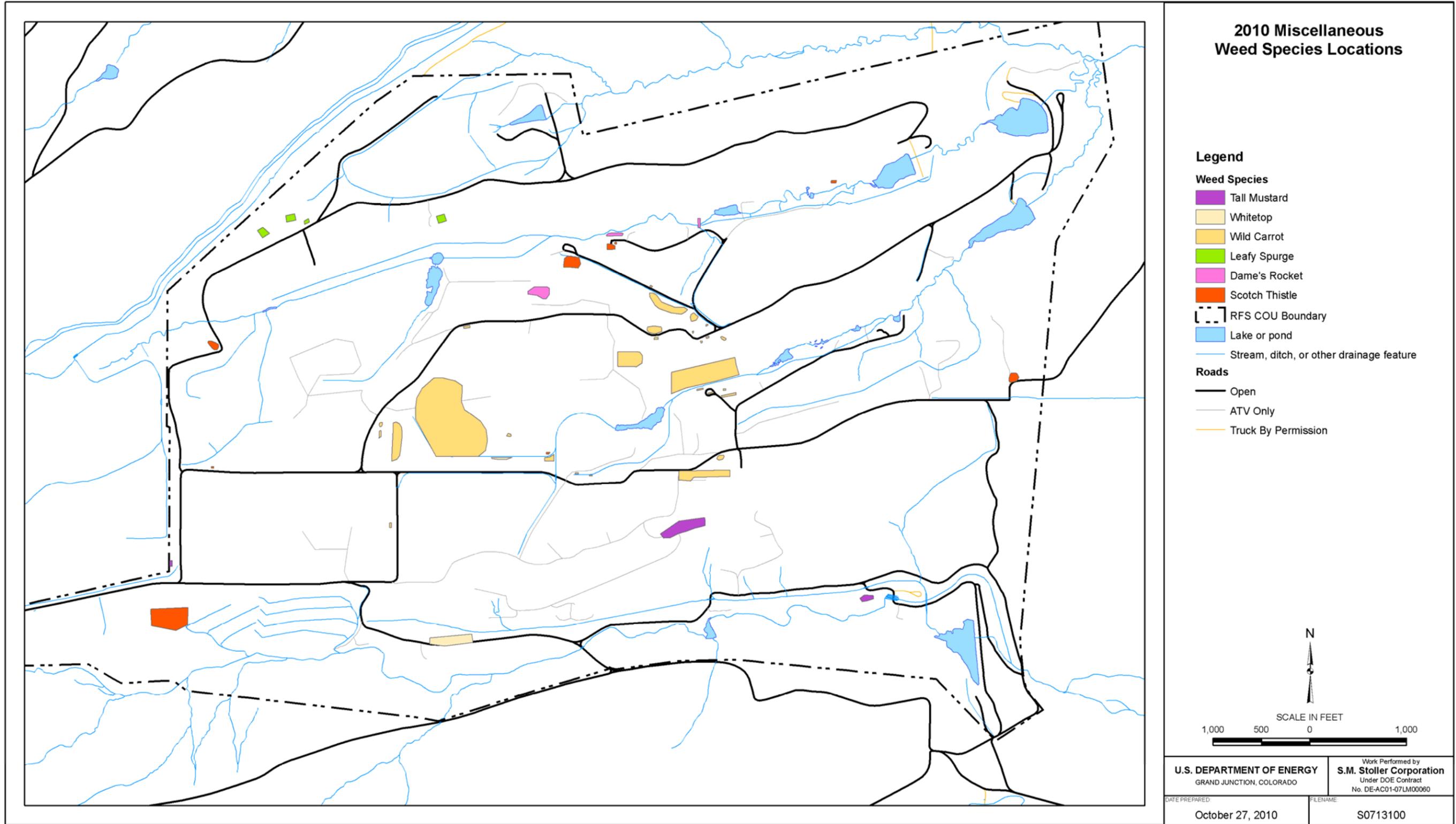
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Figure 2. 2010 Diffuse Knapweed (*Centaurea diffusa*) Distribution.



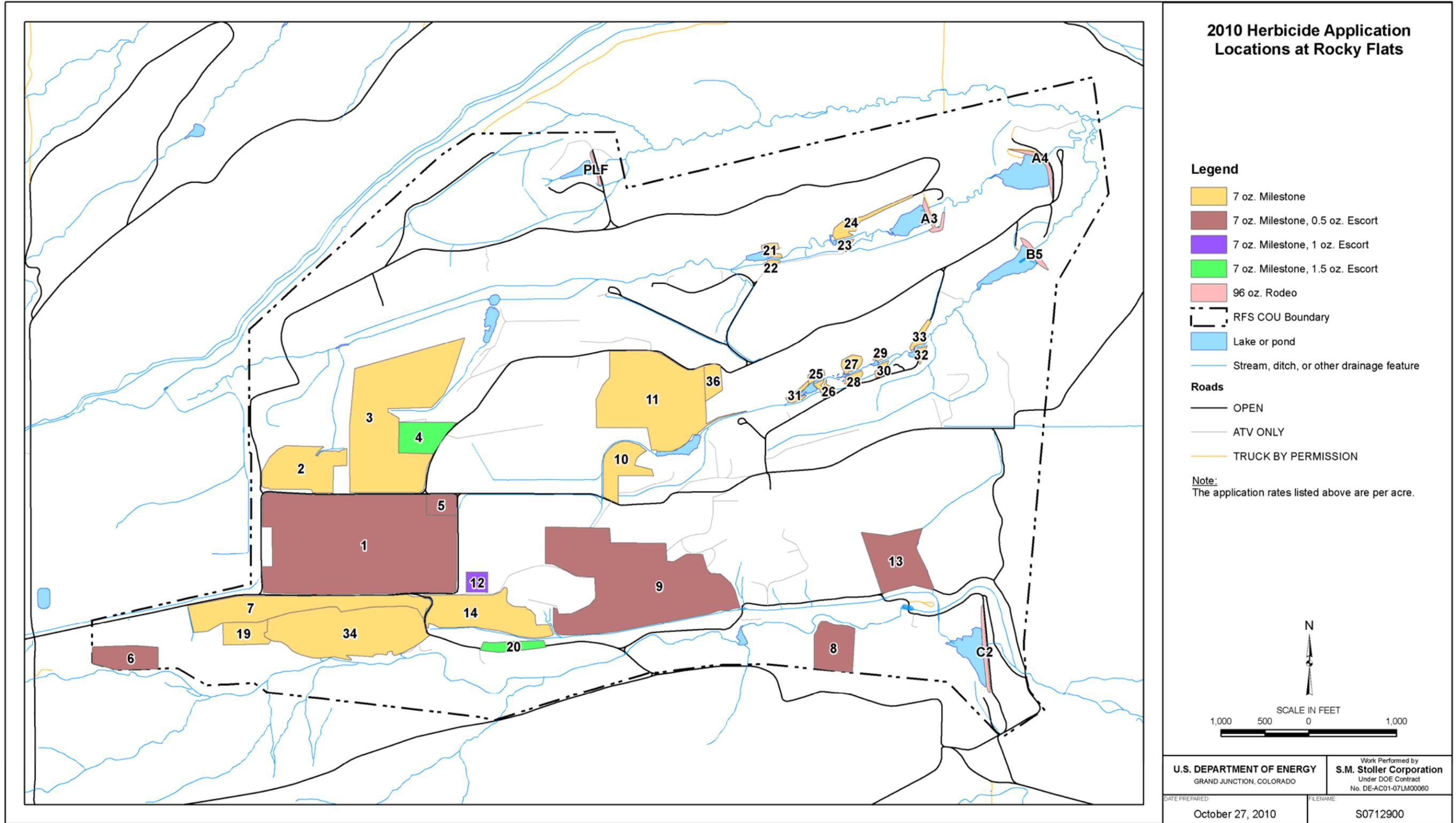
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Figure 3. 2010 Dalmatian Toadflax (*Linaria dalmatica*) Distribution.



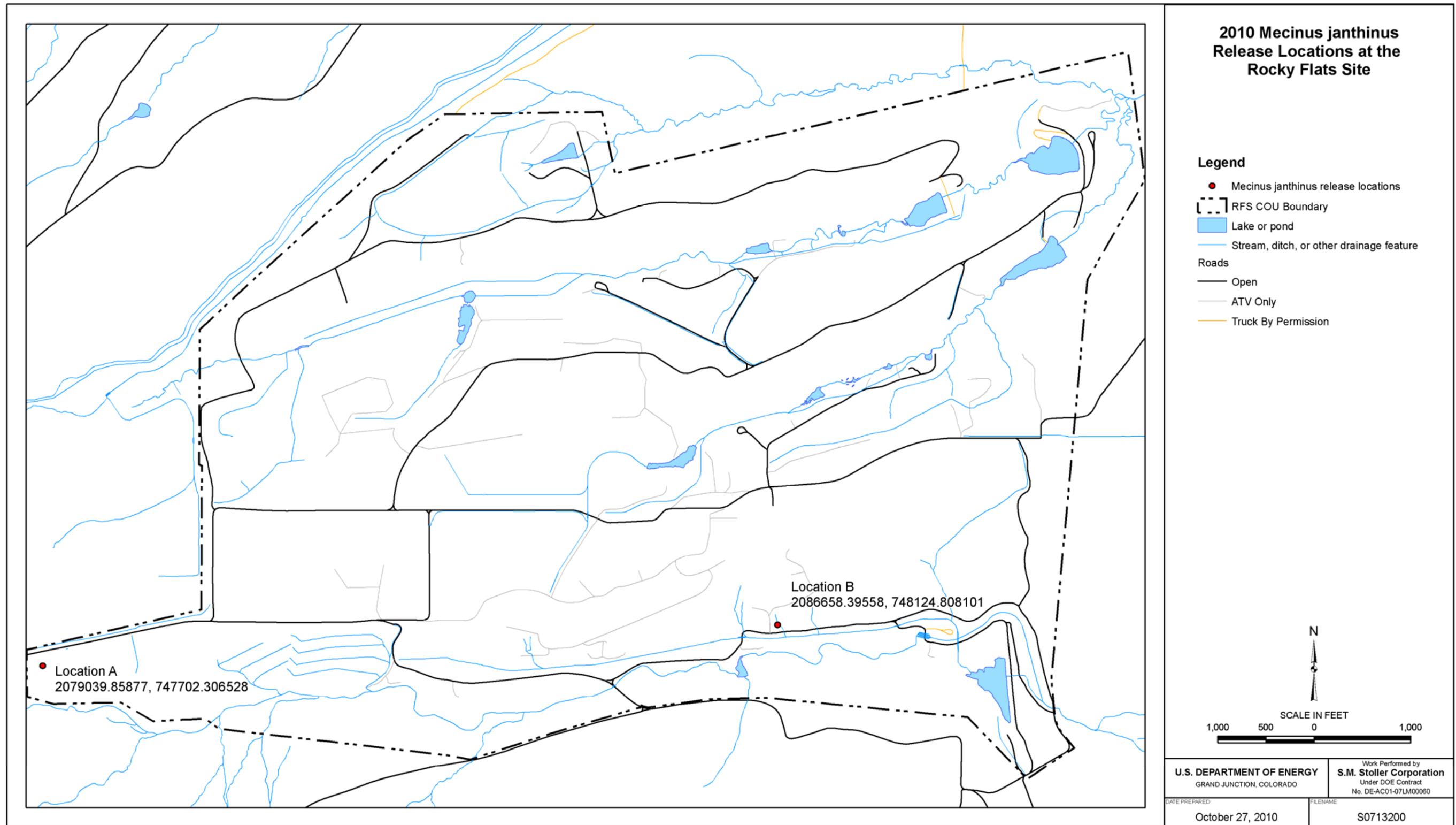
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Figure 4. 2010 Miscellaneous Weed Species Locations.



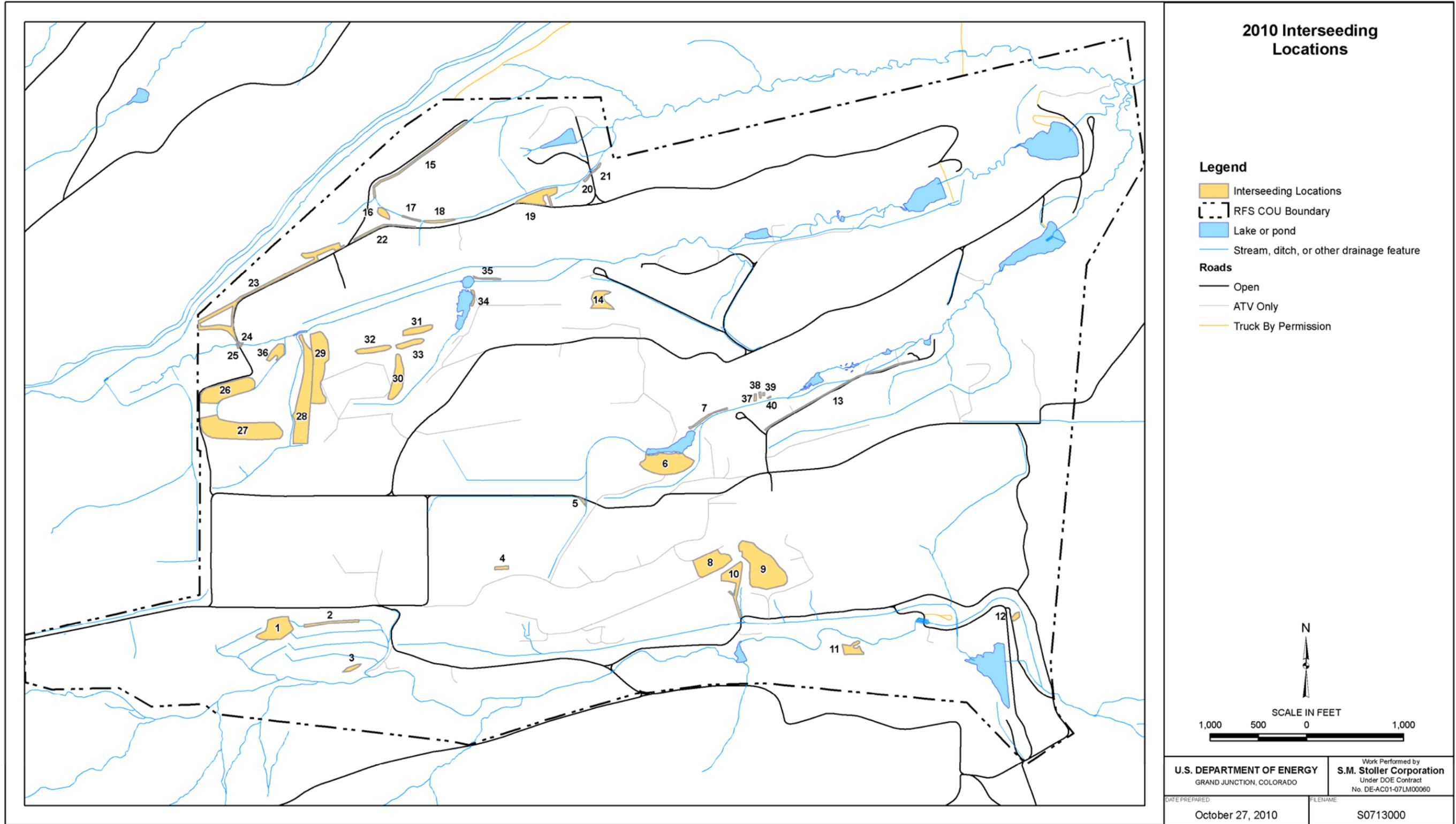
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Figure 5. 2010 Herbicide Application Locations at Rocky Flats.



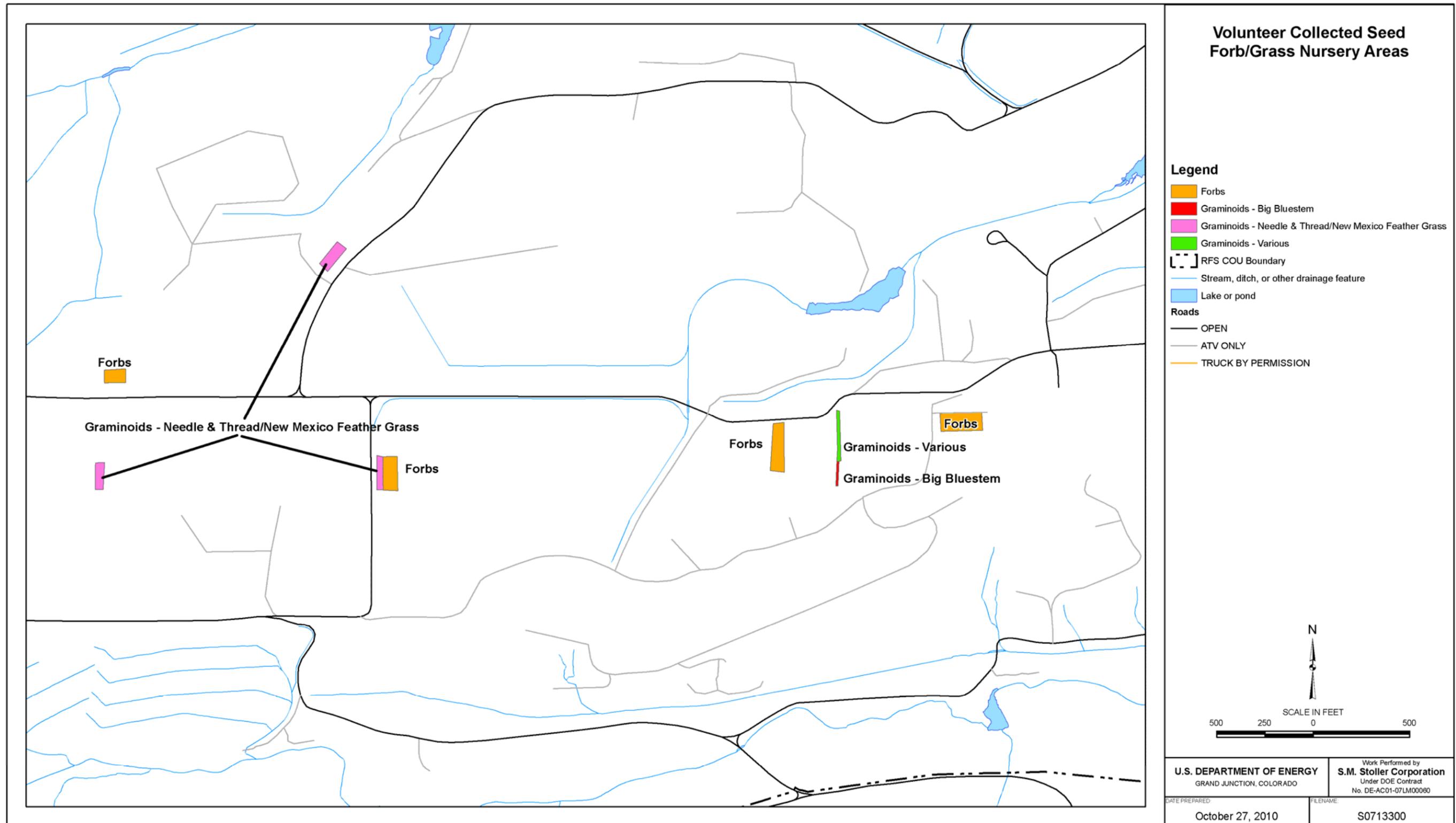
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Figure 6. 2010 *Mecinus janthinus* Release Locations at the Rocky Flats Site.



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Figure 7. 2010 Interseeding Locations.



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Figure 8. Volunteer Collected Seed Forb/Grass Nursery Areas.

Table 1. COU Noxious Weed Acreage Summary (2007-2010)

Species	Density (acres)				Total	% of Total COU
	High	Medium	Low	Scattered		
Diffuse knapweed						
2007	2.2	41.2	248.8	167.7	459.9	35
2008	1.8	20.6	110.0	147.5	279.9	21
2009	1.6	44.6	231.2	147.5	424.9	32
2010	0.1	10.6	155.0	64.3	230.1	18
Dalmatian toadflax						
2007	77.1	51.0	0.0	109.0	237.1	18
2008	0	0	54.3	151.8	206.1	16
2009	2.1	16.8	56.5	386.7	462.1	35
2010	0.0	2.1	64.2	101.4	167.7	13

The total acreage of the COU is 1308 acres.

Table 2. FY2010 Herbicide Application Summary

Location	Target Species*	Treatment	Actual Acreage Treated**	Time of Year Treated
1	CED11	7 oz. Milestone, 0.5 oz. Escort	57.00	Spring 2010
2	CED11	7 oz. Milestone	9.50	Spring 2010
3	CED11	7 oz. Milestone	34.00	Spring 2010
4	CADR1	7 oz. Milestone, 1.5 oz. Escort	4.25	Spring 2010
5	CADR1	7 oz. Milestone, 0.5 oz. Escort	2.00	Spring 2010
6	CED11, VETH1	7 oz. Milestone, 0.5 oz. Escort	5.00	Spring 2010
7	CED11	7 oz. Milestone	13.00	Spring 2010
8	CED11, VETH1	7 oz. Milestone, 0.5 oz. Escort	6.00	Spring 2010
9	CED11	7 oz. Milestone, 0.5 oz. Escort	42.00	Spring 2010
10	CED11	7 oz. Milestone	4.80	Spring 2010
11	CED11, DACA1	7 oz. Milestone	26.00	Spring 2010
12	CADR1	7 oz. Milestone, 1 oz. Escort	1.50	Spring 2010
13	CED11, VETH1	7 oz. Milestone, 0.5 oz. Escort	9.50	Spring 2010
14	CIAR1	7 oz. Milestone	11.00	Spring 2010
19	CED11, VETH1, ONAC1	7 oz. Milestone	3.50	Spring 2010
20	CADR1	7 oz. Milestone, 1.5 oz. Escort	2.00	Spring 2010
21	CED11, CIAR1, MEOF1	7 oz. Milestone	0.50	Spring 2010
22	CED11, CIAR1, MEOF1	7 oz. Milestone	0.30	Spring 2010
23	CED11, CIAR1, MEOF1	7 oz. Milestone	0.30	Spring 2010
24	CED11, CIAR1, MEOF1	7 oz. Milestone	1.75	Spring 2010
25	CED11, CIAR1, MEOF1	7 oz. Milestone	0.50	Spring 2010
26	CED11, CIAR1, MEOF1	7 oz. Milestone	0.60	Spring 2010
27	CED11, CIAR1, MEOF1	7 oz. Milestone	0.75	Spring 2010
28	CED11, CIAR1, MEOF1	7 oz. Milestone	0.50	Spring 2010
29	CED11, CIAR1, MEOF1	7 oz. Milestone	0.40	Spring 2010
30	CED11, CIAR1, MEOF1	7 oz. Milestone	0.50	Spring 2010
31	CED11, CIAR1, MEOF1	7 oz. Milestone	0.25	Spring 2010
32	CED11, CIAR1, MEOF1	7 oz. Milestone	0.25	Spring 2010
33	CED11, CIAR1, MEOF1	7 oz. Milestone	0.75	Spring 2010
34	CED11	7 oz. Milestone	21.50	Spring 2010
36	CED11, DACA1	7 oz. Milestone	1.60	Spring 2010
Riprap Dam Faces	Total Kill	96 oz/acre Rodeo	2.9	Spring 2010
Total Area Treated in 2009			264.4	

* Species Codes: CADR1 = Whitetop, CED11 = Diffuse knapweed, CIAR1 = Canada thistle, DACA1 = Wild Carrot, MEOF1 = Yellow Sweetclover, ONAC1 = Scotch Thistle, VETH1 = Common Mullein

** Acreages based on billing statements, not original GPS locations provided to subcontractor.

Table 3. 2010 Revegetation Location Summary

Location	Seeding Date	Approximate Acreage	Seed Mix*	Seeding Method
1	3/3/10	1.35	Mesic seed mix	Broadcast seeded
2	1/18/10	0.30	Mesic seed mix	Broadcast seeded
3	4/20/10	0.13	Mesic seed mix	Broadcast seeded
4	10/11/10	0.10	Xeric seed mix	Broadcast seeded
5	10/11/10	0.05	Xeric seed mix	Broadcast seeded
6	4/14/10	2.11	Mesic seed mix	Broadcast seeded
7	4/11/10	0.16	Mesic seed mix	Broadcast seeded
8	6/23/10	1.50	Mesic seed mix + PAVI1	Broadcast seeded
9	6/23/10	3.26	Mesic seed mix + PAVI1	Broadcast seeded
10	6/23/10	0.94	Mesic seed mix + PAVI1	Broadcast seeded
11	10/11/10	0.42	Mesic seed mix + PAVI1	Broadcast seeded
12	10/11/10	0.11	Mesic seed mix	Broadcast seeded
13	4/11/10	0.39	Mesic seed mix	Broadcast seeded
14	3/30/10	0.64	Wetland seed mix	Broadcast seeded
15	3/30/10	0.54	Xeric seed mix	Broadcast seeded
16	3/31/10	0.20	Xeric seed mix	Broadcast seeded
17	3/31/10	0.07	Xeric seed mix	Broadcast seeded
18	3/31/10	0.15	Xeric seed mix	Broadcast seeded
19	3/31/10	0.92	Xeric seed mix	Broadcast seeded
20	3/31/10	0.04	Mesic seed mix	Broadcast seeded
21	3/31/10	0.05	Mesic seed mix	Broadcast seeded
22	3/31/10	0.24	Xeric seed mix	Broadcast seeded
23	3/31/10	1.95	Xeric seed mix	Broadcast seeded
24	10/11/10	0.03	Mesic seed mix	Broadcast seeded
25	10/11/10	0.02	Mesic seed mix	Broadcast seeded
26	1/18/10	1.93	Mesic seed mix + PAVI1	Broadcast seeded/harrowed
27	1/18/10	3.40	Mesic seed mix + PAVI1	Broadcast seeded/harrowed
28	3/16/10	2.98	Mesic seed mix + PAVI1	Broadcast seeded/harrowed
29	3/31/10	2.33	Xeric seed mix	Broadcast seeded
30	3/16/10	0.95	Mesic seed mix + PAVI1	Broadcast seeded
31	4/1/10	0.44	Xeric seed mix	Broadcast seeded
32	4/1/10	0.40	Xeric seed mix	Broadcast seeded
33	4/1/10	0.36	Xeric seed mix	Broadcast seeded
34	4/3/10	0.08	Mesic seed mix	Broadcast seeded
35	4/3/10	0.09	Mesic seed mix	Broadcast seeded
36	3/31/10, 10/11/10	0.42	Mesic seed mix + PAVI1	Disced/broadcast seeded/harrowed
37	4/11/10	0.04	Mesic seed mix	Broadcast seeded
38	4/11/10	0.03	Mesic seed mix	Broadcast seeded
39	4/11/10	0.01	Mesic seed mix	Broadcast seeded
40	4/11/10	0.01	Mesic seed mix	Broadcast seeded
Total		29.12		

*Seed mixes are listed in the Rocky Flats, Colorado, Site Revegetation Plan, January 2009.

This can be found at: http://www.lm.doe.gov/Rocky_Flats/SOG.aspx

PAVI1 = Panicum virgatum (switchgrass)